

	All Cases (n = 60)	Male Cases (n = 37)	Female Cases (n = 23)
HHE	51%	40%	69%
Odds Ratio	9.8*	2.9*	8.2*
(90% C.I.)	(4.3–24)	(1.1–8.2)	(2.2–30.7)

*p < 0.01 compared with controls.

Conclusions: High plasma homocysteine concentration is a powerful risk factor for thrombosis in both men and women. Since homocysteine can be reduced by B vitamins, a possible therapeutic role for these agents may exist in patients with thromboembolism.

988-27 Accelerated Thrombolysis Using a New Intravascular Therapeutic Ultrasound Catheter

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Preclinical experiments were carried out to evaluate the performance and safety of a newly developed catheter, tipped with a ultrasound transducer designed to accelerate thrombolysis. Urokinase (UK, 240IU/ml) was added to artificial thrombus produced by in vitro Chandler's tubes (diameter 3 mm). The miniature ultrasound (US) emitting ceramic element (diameter 1 mm) mounted at the tip of a 3F catheter was inserted directly inside the tube near the artificial thrombus. US (1 MHz) was exposed for a total of 60 sec at an intensity of 0.3 W/cm². Fibrinolysis was determined by the percentage of weight loss of thrombus after incubation of 15 to 90 minutes.

	Incubation (min)			
	15	30	60	90
UK alone	12 ± 2.4	28 ± 2.6	40 ± 1.2	46 ± 4.6
UK + US	33 ± 6.1*	44 ± 3.3*	56 ± 7.2*	67 ± 1.8*

n = 5, *Significant differences, UK vs UK + US, p < 0.05

US exposure alone showed no fibrinolysis.

Ultrasound exposed for durations of 30 minutes with the same device and conditions to normal rabbit (n = 5) abdominal aorta resulted in no significant tissue damage (Histological and SEM observations).

Conclusion: Therapeutic ultrasound emission from the new flexible intravascular catheter accelerated thrombolysis. Clinical application of this device for peripheral vascular thrombosis is anticipated.

988-28 Silent Pulmonary Embolism in Patients With a Permanent Transvenous Pacemaker

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Pulmonary embolism (PE) is a frequently silent but occasionally serious complication of permanent transvenous pacing. To examine the correlation between PE and venous route thrombus, age, sex, follow-up interval, type of pacemaker (DDD or VVI), cardiac function and type of arrhythmia in patients (pts) with permanent transvenous pacing, we performed pulmonary perfusion scintigraphy (PPS), digital subtraction angiography (DSA) and transesophageal echocardiography (TEE) in 42 pts with a pacemaker who did not take anticoagulation therapy. The pts were divided into two groups according to the presence of perfusion defect by PPS: 29 pts without perfusion defect (PE-) and 13 pts with perfusion defect (PE+). Of 36 pts, 15 pts (35.7%) complicated venous thrombus by DSA and 2 pts (4.8%) complicated right atrial thrombus by TEE.

	PE(+)	PE(-)	p
Age	70 ± 12	66 ± 10	n.s.
Sex (% male)	46.2	51.7	n.s.
Follow-up interval (yrs)	5.3 ± 4.5	5.0 ± 3.2	n.s.
Type of pacemaker (% DDD)	38.5	24.1	n.s.
Ejection fraction (%)	64 ± 12	70 ± 6	n.s.
Atrial fibrillation (%)	30.8	6.9	<0.05
Venous route thrombus (%)	76.9	17.2	<0.001

We conclude atrial fibrillation and venous thrombus frequently bring about PE in pts with a transvenous pacemaker and suggesting that origin of thrombus causing PE is mainly venous thrombus of upper limb.

989 Altering Risk Factors

Tuesday, March 26, 1996, 3:00 p.m.–5:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 3:00 p.m.–4:00 p.m.

989-37 Circadian Variation of Ventricular Tachyarrhythmias in Patients With and Without Coronary Artery Disease

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Myocardial ischemia has been proposed to be a major mechanism for the morning peak of acute myocardial infarction and malignant arrhythmias resulting in sudden cardiac death. However, little is known about the circadian variation of arrhythmias in patients without ischemic heart disease. The purpose of this study was to compare the diurnal distribution of life-threatening ventricular tachyarrhythmias in patients with and without coronary artery disease (CAD).

We studied 159 patients with an implantable defibrillator (ICD). During follow-up 87 patients (55%) had spontaneous appropriate shock episodes (SE). The underlying heart disease was CAD in 53 patients (61%). Thirtyfour patients (39%) had nonischemic heart disease (dilated cardiomyopathy n = 22, arrhythmogenic right ventricle n = 3, valve replacement n = 4, no structural heart disease n = 5). Time distribution (TD) of SE (calculated as percentage of SE at 0–6/6–12/12–18/18–24 hours) was determined in all patients and in those with and without ischemic heart disease. SE (n = 448; mean 5.3 ± 7.3) in all patients showed a clear circadian variation (TD of SE (%): 18/35/27/20, p < 0.001) with a morning peak. In patients with CAD the same distribution of SE (n = 289) was observed (TD of SE (%): 14/40/27/19, p < 0.001). However, in patients without ischemic heart disease SE (n = 159) were evenly distributed (TD of SE (%): 23/28/27/22, p = 0.86). If directly compared SE were distributed significantly different between both subgroups (p = 0.02).

Patients with CAD exhibit a circadian variation of SE. In contrast, those patients without ischemic heart disease demonstrate an even distribution of SE. These findings may underline the role of ischemia for the genesis of malignant arrhythmias in ICD patients and may help to develop specific therapeutic strategies in this patient population.

989-38 Beneficial Effects of Cardiac Rehabilitation and Exercise Training on Autonomic Determinants of Risk

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Autonomic nervous system variables including baroreflex and heart rate variability have been shown to predict prognosis following major cardiac events. Although cardiac rehabilitation and exercise training (CR) reduce subsequent major CHD events, the effects of this therapy with standard regimens on autonomic variables are not known. Accordingly, we studied 20 consecutive patients following a major CHD event, both before and after a formal 12-week outpatient, phase II CR program, to determine the effects of this therapy on autonomic variables, and compared these results to 8 similar CHD patients who did not participate in formal CR. A standard medical regimen for CHD was used in all patients and was not altered during the program. Analysis of RR interval and systolic arterial pressure provided a measure of heart rate variability (RR interval variance, σ^2) and of baroreflex gain [by the frequency domain index (α)]. Results are:

		SAP (mmHg)	RR (msec)	σ^2 (msec ²)	α (msec/mmHg)
Rehab patients	Entry	127 ± 16	966 ± 102	538 ± 394	6.6 ± 0.9
	Exit	123 ± 16	1076 ± 204*	1202 ± 835*	10.4 ± 4.4*
Control patients	Entry	124 ± 10	961 ± 55	604 ± 487	6.6 ± 2.1
	Exit	125 ± 29	1036 ± 105	850 ± 565	8.8 ± 8.0

Data are expressed as median ± Semi Inter Quartile. *p < 0.05 Entry vs Exit (non-parametric ANOVA)

Conclusion: CR resulted in significant improvements in autonomic function, including significant increases in RR interval, of its variance, and of baroreflex gain. These improvements may influence the overall benefits of CR programs in the secondary prevention of CHD above and beyond those provided by standard medical regimens.